DOCUMENT RESUME

ED 403 883 IR 018 240

AUTHOR Collis, Betty; Breman, Jeroen
TITLE Information Technology Education in a Cooperative Environment: Design and Evaluation.
PUB DATE Feb 97
NOTE 18p.; Paper presented at the Annual Meeting of the Association for Educational Communications and Technology (Albuquerque, NM, February 12-16, 1997).
PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Computer Mediated Communication; Computer Uses in Education; *Cooperative Learning; *Course Descriptions; Foreign Countries; Group Experience; Higher Education; Information Technology; *Instructional Design; *Instructional Development; *Instructional Material Evaluation; Learning Strategies; *Multimedia Materials; Problem Solving; Student Role; Teacher Role; Teamwork; Theory Practice Relationship; World Wide Web
IDENTIFIERS Learning Environment; *University of Twente (Netherlands)

ABSTRACT

Problem-centered project work, involving groups who work and learn collaboratively, is an important form of instructional organization. This is especially true for students learning about the design and development of multimedia learning materials, since working as members of design teams will be an important part of the professional futures of many of the students. At the University of Twente in The Netherlands, students in the Faculty of Educational Science and Technology have an initial experience in the multimedia-design process in a first year required course. Covering two cycles of the course, this paper describes the instructional design of the course itself and illustrates how information technology is both studied and used as the learning environment in the course. It shows how the World Wide Web (WWW) provides an integrated setting for the students, so they can experience as learners the sorts of environments they are studying and designing in their groups. Emphasis is placed on: the integration of process and product; evaluation as a key unifying process throughout the course; the use of "productive communication" (semi-structured messages entered on the class web site); learning how to learn; and the implications of the new roles for both students and instructors. An appendix includes student evaluation feedback data. (Contains 20 references.) (Author/SWC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 403 883

INFORMATION TECHNOLOGY EDUCATION IN A COOPERATIVE ENVIRONMENT: DESIGN AND EVALUATION

Betty Collis and Jeroen Breman

Dr. Betty Collis
Faculty of Educational Science and Technology
University of Twente
Postbox 217
7500 AE Enschede, The Netherlands
collis@edte.utwente

drs. Jeroen Breman
Department of Instructional Systems
Pennsylvania State University
University Park, PA 16802
jxb66@psu.edu

Paper prepared for the AECT '97 Annual Conference, Albuquerque, New Mexico, February 12-16 1997 and selected for inclusion in M. R. Simonson, (Ed.), *1997 Proceedings of Selected Research & Development Paper Presentations*, sponsored by the Research and Theory Division of AECT

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Betty Ann Collis
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

CS 018 340

INFORMATION TECHNOLOGY EDUCATION IN A COOPERATIVE ENVIRONMENT: DESIGN AND EVALUATION

Betty Collis* and Jeroen Breman**
*University of Twente, The Netherlands, collis@edte.utwente
** Pennsylvania State University, jxb66@psu.edu

Abstract

Problem-centered project work, involving groups who work and learn collaboratively, is an important form of instructional organization. This is especially so for students learning about the design and development of multimedia learning materials, in that working as members of design teams will be an important part of the professional futures of many of the students. At the University of Twente in The Netherlands, students in the Faculty of Educational Science and Technology have an initial experience in the multimedia-design process as an integral part of a first-year required course. In this paper, we identify key issues in the instructional design of the course itself, illustrate how information-technology is not only studied in the course but also used as the learning environment, and in particular show how the WWW provides an integrated setting for the students, so that they can experience as learners the sorts of environments they are studying about and designing in their groups. An extensive evaluation of the first cycle of the course (September 1995-June 1996) was carried out, and its results integrated into the 1996-97 cycle. In particular, stress is being given to the integration of process and product, to evaluation as a key unifying process throughout the course, on the use of "productive communication", our emphasis on learning how to learn, and on the implications of the new roles for both students and instructors. In each of these categories the course ISM-1 WWW site plays a critical role in the "pedagogical engineering" of the course which is occurring. The course site can be accessed at http://www.t.utwente.nl/ism/ism1-96/home.htm

Group-Based Cooperative Learning for Multimedia Design Education

Although the importance of instructional methods that foster learner self-reliance and that support cooperative learning have been long established, their combination in a course for problem-oriented multimedia design education is less familiar. Learner self-reliance has many aspects, including self-awareness, "actively willing to seek feedback from others and able to give constructive feedback"; skill in action planning and implementation, such as the ability to organize time effectively, and to monitor and evaluate progress against specific criteria; and the development of the habit of reflection, learning from one's own experiences as well as those of others (Hawkins & Winter, 1996). Contributing effectively to group-based cooperative learning situations involving working together to design, develop, and evaluate a solution to a complex problem, requires all not only self-reliance skills on the part of each individual group member, but also success with additional aspects such as consensus about the group's goals, individual responsibility toward the communal attainment of those goals, efficient procedures for group self-management, and group cohesiveness and internal positive spirit (Slavin, 1990). Such problem-centered, cooperative instructional orientations are seen as are seen as critical for the development of life-long learners (Casey & Tucker, 1994), and perhaps one domain where life-long learning will be most important is that of the educational technologist. The rapid emergence of new forms of media and new communication channels is leading to an explosion of new forms of media products, including environments and tools as well as structured learning resources for hyperlinked multimedia distributed networks (Collis, 1996). The educational technologist (or instructional technologist) will be increasingly challenged to provide professional leadership in rapidly changing technical and pedagogical environments, and thus life-long learning will be a job requirement (Gustafson, 1993).

There are some examples in the literature of descriptions of courses for prospective educational technologists that are designed around this kind of future-looking, group-based, project

orientation for interactive multimedia design and production. For example, Liu (1996) at the University of Texas at Austin uses a collaborative learning approach to "simulate real-world multimedia production" with her graduate students and notes that "the authentic aspect of the learning experience motivated many students because they perceived it as helpful to get them better prepared for the job market. The collaboration and interaction among groups enhanced students' understanding of the multimedia technology" (p. 787). Liu and Rutledge (1996) also extend this approach with much younger learners, secondary students, also with positive results in terms of both process and product. But regardless of the maturity of the learners, the approach is challenging to implement in practice, particularly for the instructor, who among many responsibilities must monitor appropriate time management by the learners, find an efficient and effective method for feedback and motivation, and foster knowledge construction as well as product production (for example, see Liu & Rutledge, p. 400).

General Description of the Course "ISM-1", Cycle 1 (1995-1996), and Cycle 2 (1996-1997)

At the University of Twente, students in the Faculty of Educational Science and Technology work within a problem-solving framework throughout their study. In fact, the Twente approach to educational technology is that of "an engineering approach to educational problems'. Within the Faculty, one department specializes in the design, development, and evaluation of educational media products, what the Dutch call "instrumentatietechnologie", or literally, the technology of learning instruments. This department is known internally as "ISM" and thus its required course for first-year students is called "ISM-1". The course is regularly refreshed and revised, to reflect the rapidly changing nature of educational media. In the previous few years, considerable attention has been given to moving from older forms of media such as audio-slide presentations, text- and graphics- based computer simulations and tutorials, and interactive-video products to computer-based multimedia. In 1996, the increasing educational use of distributed networks to access multimedia resources, particularly via WWW protocols, means that instrumentation for these sorts of situations needs to become part of the students' experience. In particular, we have three general goals for our students: that they learn about educational media, its implementation possibilities and its effects in its full range of forms; that they gradually become competent as professionals in the overall design and life-cycle process of learning materials; and that they base this learning, not only on theory but also on practice. Also, the staff has an additional goal: that we practice what we preach, and therefore that students gain critical insights into educational media through actually learning with such media themselves.

The course "ISM-1" is the first initiation of the students to the field of educational media and to the particular practice and philosophy of the Department ISM. Following is a brief description of the course. In particular, we refer to the two most-recent cycles of the course, that of 1995-96 (referred to as Cycle 1) and the current 1996-97 (referred to as Cycle 2).

General goals.

There are four major, intertwined sets of goals for the course, relating to its:

-Content and theoretical framework: To introduce students to major forms of educational instrumentation, to a model for the lifecycle of media products, and to terminology and concepts relevant to each of these phases as well as to different forms of educational instrumentation .

-Practical experiences with software tools and media-related equipment: To introduce students to a broad range of professional tools and equipment for the design and development of educational instrumention, and to scaffold students in their use of these resources in their own project experiences.

-Group-related goals: Critical to the course is the experience of working as a group, toward the solution of a realistic problem. The "Jigsaw Method" (Aronson, Blaney, Stephen, Sikes, & Snapp, 1978) is used in the course. In the Jigsaw Method, every

student has his or her own unique responsibility to the group; like a piece in a jigsaw puzzle, the result can not be whole without all these unique pieces fitting well together.

-Individual goals related to the process of becoming a professional: The research from groupwork emphases not only the importance of group goals and group interrelationships in social constructivism, but also the importance of the individual in his or her own learning and development (Jonassen, 1995). In ISM-1, important goals relate to the individual learner him- or herself. Learning how to learn, learning to take self-responsibility for one's own study habits, learning how to be an effective self-evaluator, learning how to ask questions and how to find help after one has used one's own resources for answers; all are important.

Course organization

The course is organized around three problem settings, each of which motivates a group project extending over a trimester (12 weeks). Each project in turn is based on a realistic problem. Students are organized in groups of eight or nine, where each group has a Manager, and each pair of students has a "specialism" which they must bring to the common solution of the problem that the group is confronting. . Each group is responsible for contributing a component of an overall solution to the given problem. For example, the problem for the first project of ISM-1, 1996-97 cycle, was to help first-year students in the faculty (in fact, themselves), to find information about different problems which they might encounter as students new to the university, problems with housing, finances, personal relations, health, study skills, choice of study, emotions and stress, and to have a convenient way to make contact with appropriate persons who can help them further. The WWW was chosen as an appropriate instrumentation form for such a communication and information system. Each group was responsible for designing and constructing a suite of WWW pages relating to one of the problem areas, and together all eight sets of WWW pages would comprise the overall solution.

Time commitment

Each group is expected to work together for four hours per week, during a scheduled time but generally without an instructor present. In addition, each student individually is responsible for staying on tempo with the study materials of the course, approximately two hours per week, and for attending all of the five scheduled lecture sessions per project. The total over the full year should relate to 240 hours of participation time.

Determining the course mark.

The final mark for the course consists of the average of the three group-project marks (with in general all members of the group receiving the same mark) and the scores on three written tests, one after each project. Students must have at least a passing mark in each of these for the overall mark to be averaged and awarded.

Integrating the course within an electronic environment.

In the first cycle of the course, the *FirstClass* computer conferencing environment was used not only for all course communications but also for course and project organisation and for lecture notes. There was a separate textbook as well as various sets of handouts for the students which they were expected to keep in a binder. In the second cycle, taking insights from an extensive evaluation carried out during the 1995-96 cycle (Breman & Carleer, 1996) all course resources have been redesigned within a single WWW-based course environment. Instead of a textbook, all reading materials are included within this environment. This WWW environment is discussed extensively further in this paper.

Evaluation study and results

Rather than giving more overall description of the ISM-1 course, we will instead focus on six major attentions points emerging during the 1995-96 cycle and its evaluation, and describe the evolution of the 1996-97 cycle of the course relative to these attention points. The evaluation was

commissioned by the Faculty because of the innovative aspects of the course for first-year students. Could these young students work without direct supervision? Could they handle group work, combined with self-responsibility? If the emphasis was on process, rather than product, what would be the norms for satisfactory achievement? An external evaluator was appointed to work closely with the Course Team throughout the 1995-96 year, as an observer and also as someone offering on-going comments and impressions. The evaluator also observed and interviewed students as they worked on the projects, interacted on a personal basis with different groups of the students in the course throughout the year, and prepared a written analysis after each of the three projects as well as a final report (Breman & Carleer, 1996).

The final conclusions of the evaluation study reflected what the student achievements had already shown over the full 1995-96 cycle: That the group approach worked well, that the tasks and assignments were successfully completed with much motivation and enthusiasm (every student but one completed the course successfully), and that all involved in the course worked together responsively and creatively to learn from each experience in the course and to adapt and evolve the course accordingly. Similar results have been found from the first project of the 1996-97 cycle (See the appendix).

Given this overall, the remainder of the paper discusses major aspects of the course, and its WWW-based learning environment, in more detail.

Relating Theory To Practice: The Integrated Course Site

In 1996-97, the entire course is integrated within one WWW site. This site can be visited at:

http://www.to.utwente.nl/ism/ism1-96/home.htm

The site for Project 1 consisted of many hundred pages, all developed by the Course Team (sometimes with input from the students themselves, as will be described later). For a sense of consistency throughout the site and to help the students realize when they were still within the course site and when they were in an external link, a course logo reappears on most internal pages. Figure 1 shows the logo.

Figure 1. Logo to identity internal pages in the ISM-1 course site.

The "Week-by-Week" and "Study" Centres.

The integration of theory and practice is always a challenge, particularly in project-oriented courses. Activities cannot be metered out as practice exercises following a section of theory, as can be the case in a mathematics course, but must occur as the higher-level culmination of many different insights. Theory must be translated and applied to practice. The colleges and study materials in ISM-1 are meant to make this translation as explicit as possible. Thus, based on the experiences of the first cycle of ISM-1 as well as research occurring at TO and elsewhere, the decision was made to integrate all aspects of ISM-1, theory and practical, within one hyperlinked environment where explicit linkages can be made between weekly group work and weekly study materials. Figures 2 and 3 show the "Week-by-Week Centre" and the "Study Centre" of the ISM-1 Course Site to illustrate how the materials are presented to the students. Within each link of these centres, explicit hyperlinking occurs between the concepts in the Study Materials and College notes, and the assignments for the group activities for the week.

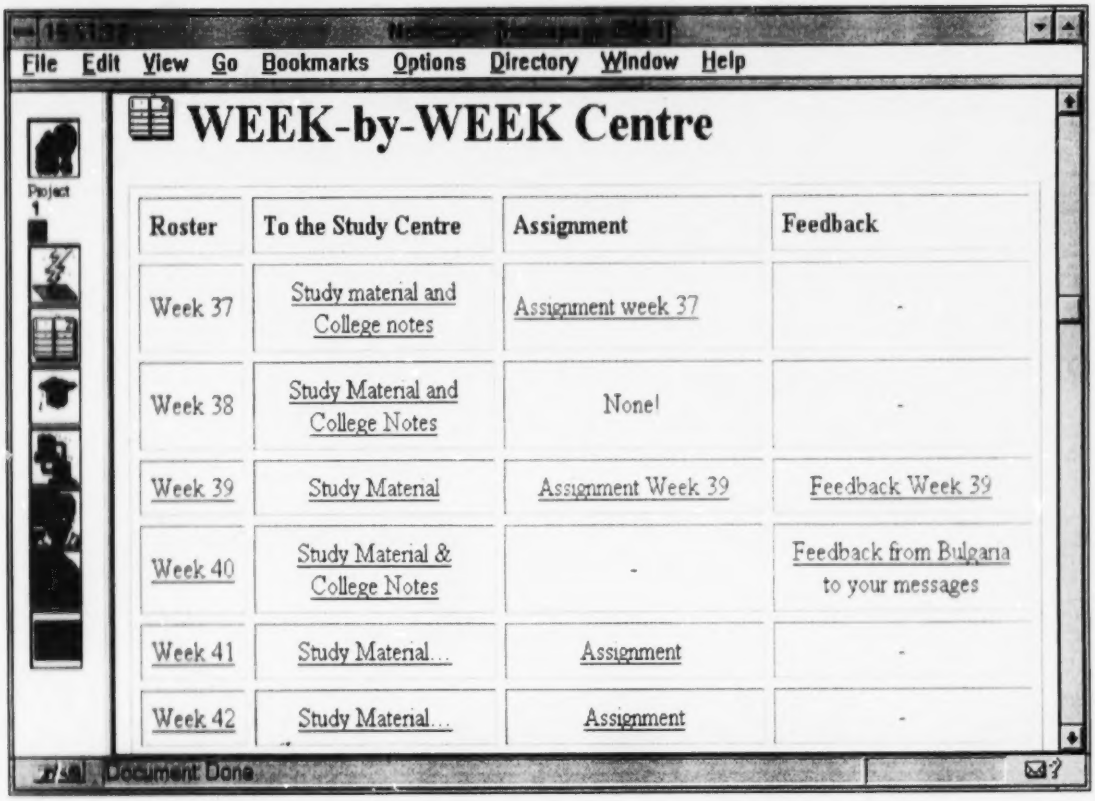

Figure2. The "Week-by-Week Centre", linking to study materials and assignments

BEST COPY AVAILABLE

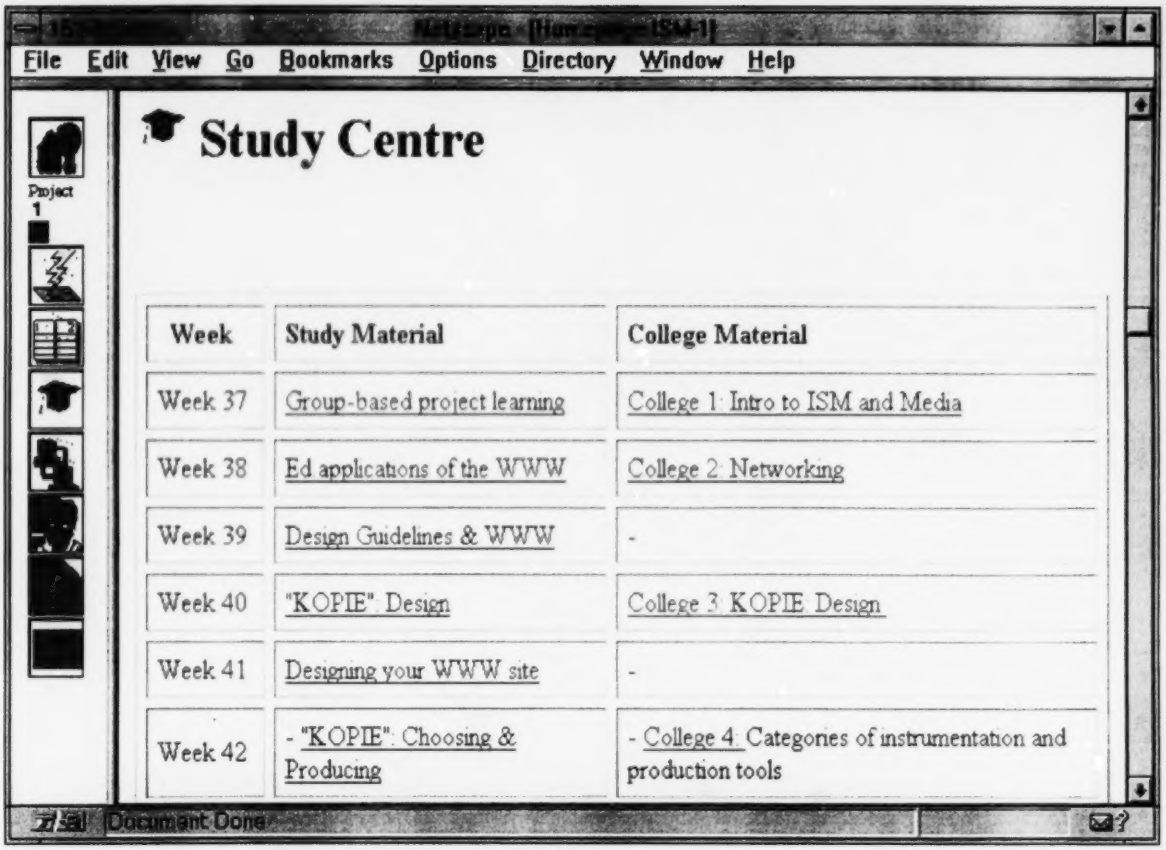

Figure 3. The "Study Centre", giving access to the theoretical materials of the course

From bound to on-line textbook.

In the first cycle of ISM-1, there were some complaints by the students about the textbook and its relevance, and about the lectures and their relevance. The Course Team was also not pleased with the fit of the textbook to the projects, even though it was the best textbook that could be found. The unique aspects of the ISM-1 course mean that no single externally produced textbook is likely to be available, appropriate for the level of the Dutch first-year students and capable of being closely related to each week of their group activities. Thus the decision was made for the second cycle of ISM-1 that the Course Team would write the theoretical materials for the course, in a form appropriate to both the group activities and also as a example to the students of how hyperlinked study materials (about which they will study in other courses in ISM and TO) can be used as learning resources.

The Course Team sees these hyperlinked study materials as having the following benefits:

- Capable of being fine-tuned to respond to each week's group experiences; thus to serve as both theoretical material and feedback from the Course Team to the class as a whole
- Capable of being linked to multimedia examples, both of student work and from outside WWW sites
- Capable of including self-testing and evaluation questions via JavaScript and CG-I forms, to stimulate interactivity while self-studying and to collect student responses to evaluative questions
- Capable of showing, as explicitly as possible, how the colleges, the study materials, the course feedback, and the group activities all are intended to be interrelated

Evaluation work in Scotland (Brown, Doughty, Draper, Henderson, & McAteer; 1996) indicates that the effective integration of resources into higher-education courses must be done in such a

BEST COPY AVAILABLE

way that students are motivated to make use of the resources, that the resources should be easy to access, that students must know the resources are available to them, and that the instructors must communicate to the students why the resources are relevant. Students are practical, and "may ignore anything not felt to be essential...use is often related to the time available to use them and the problems associated with doing so"(p. 111). By integrating the study materials with the course communication, the marking in the course, and the project work, all within the same WWW-based environment, and emphasizing the value of these study materials to the weekly activities, we hope to increase the likelihood of careful use and study of embedded resources.

Integration Of Process And Product

Important to the course is the integration of support for the group processes of the course, not only with the study materials but also with the products that the students design and produce. The WWW environment allows this integration to take place, at least for some of the products that the students will produce. Figure 4 shows the "Group Centre" environment for the course from the Course WWW Site for Project 1 of 1996-97. From this page, students can find the composition of their groups and their specific tasks, the managers of the groups were given structured group-report forms to complete on various occasions, the self-evaluation of the group relating to their own products was always available for reference, and the products themselves could be seen and evaluated by the Course Team and by the students in all of the other groups, as regular evaluation activities throughout the project. We discuss this process more in the next section.

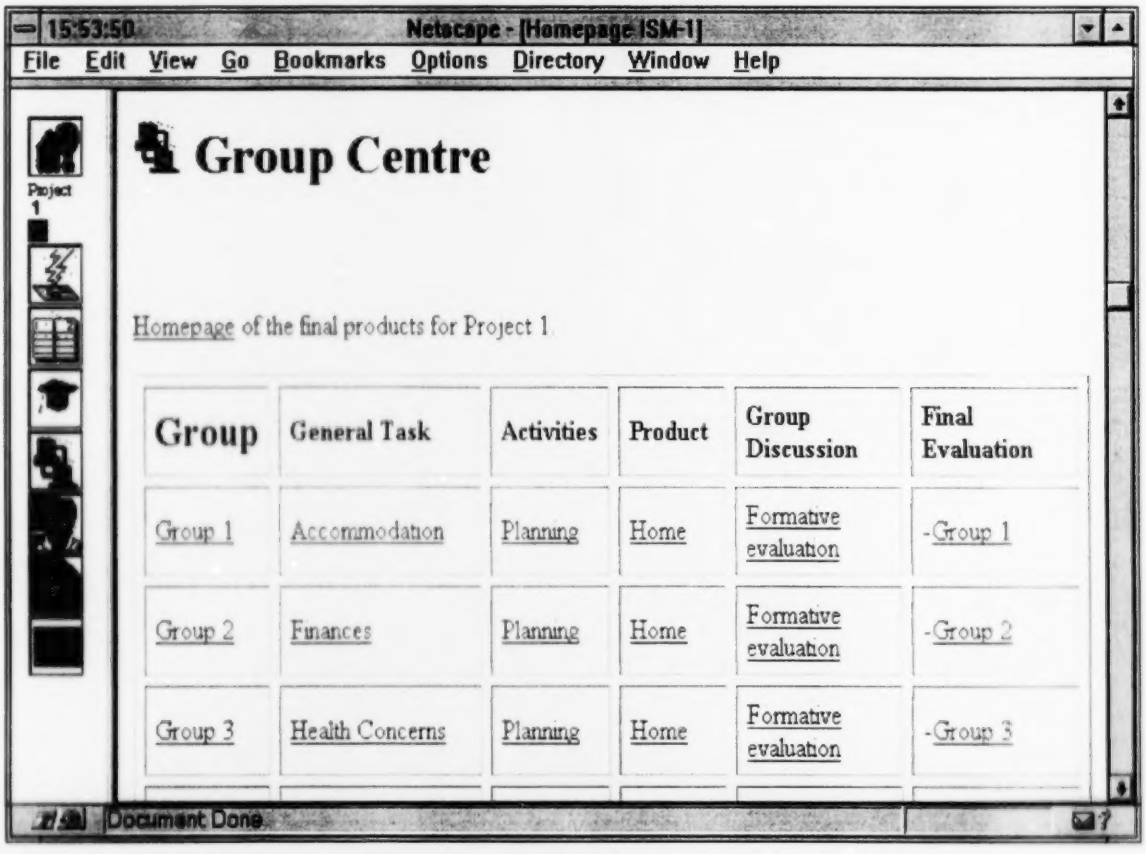

Figure4. The "Group Centre", showing links to Manager inputs, self-evaluation comments by each group, and giving access to the current stage of each group's products.

Evaluation As A Key Process

Not only because of important of developing self-evaluation skills in students as part of their growth toward more self-reliant learning (Hawkins & Winter, 1994) but also because of the more-general importance of on-going evaluation in both the multimedia lifecycle and the lifecycle of a course, we are working hard to transform evaluation from something given out at the end of a process by the instructors to something ongoing throughout the project, and for which the students themselves have the major responsibility.

Formative evaluation as a key to integrating theory and practice.

To accomplish this more effectively in the 96-97 cycle of the course we are utilizing a number of methods (Collis & Meeuwsen, 1997). One of these which is emerging as particularly versatile is that of making use of the capabilities of the WWW environment to allow us to embed CG-I forms to structure group self-evaluation and peer evaluations, and to base these evaluations not only on the concepts about formative evaluation developed in the Study Materials, but also to make the criteria for the evaluation be the set of "design guidelines" for the course. These design guidelines are developed week by week in the Study Materials, illustrated with examples from both external links and during the colleges, and used repeatedly as the criteria for formative evaluations of the group products. The design guidelines are accumulated in the Resource Centre of the Course Site. Twenty of them were developed during Project 1. The Managers were directed during Week 44 to lead their groups in self-evaluation of their sites, and to submit a report, via CG-I forms, in which they selected two of the guidelines that they felt were well met by their work and two of the guidelines for which improvement should be made. These self-evaluation reports became part of the Course Site (see Figure 4).

Peer evaluation. Following the self-evaluation, came peer evaluation. Figure 5 shows an excerpt from the Assignment materials for Week 45 of the course in which the formula to be used for peer (and later, Course Team) evaluation was presented based on the 20 design guidelines and the specialist responsibilities.

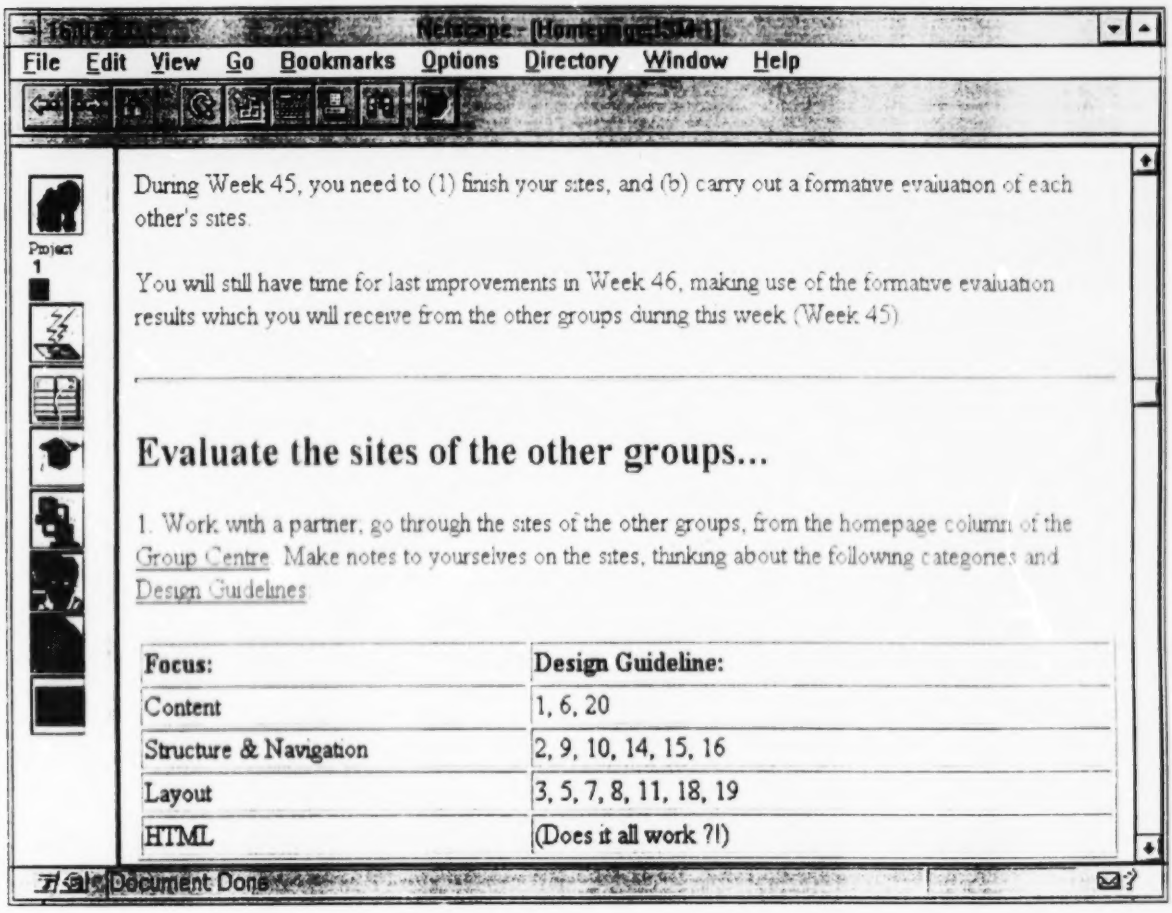
File Edit View Go Bookmarks Options Directory Window Help
Project 1
During Week 45, you need to (1) finish your sites, and (b) carry out a formative evaluation of each other's sites.
You will still have time for last improvements in Week 46, making use of the formative evaluation results which you will receive from the other groups during this week (Week 45).
Evaluate the sites of the other groups...
1. Work with a partner, go through the sites of the other groups, from the homepage column of the Group Centre. Make notes to yourselves on the sites, thinking about the following categories and Design Guidelines
Focus:
Design Guideline:
Content
1, 6, 20
Structure & Navigation
2, 9, 10, 14, 15, 16
Layout
3, 5, 7, 8, 11, 18, 19
HTML
(Does it all work ?!)
Document Done

Figure 5. Relating the design guidelines to specialist responsibilities and to the peer evaluation

Figure 6 shows the peer evaluation form, available via the WWW site as part of the Assignment for Week 45 of the course. The instructions for the week were that the Manager of each group was to organize his or her group so that members of the group evaluated each of the other seven group sites, and filled in the formative evaluation of that site. These forms were submitted (by a click on the submit button), sent to the student assistant who in turn forwarded them to the Manager of the group being evaluated and to the Course Team. It was in turn the Manager's task to discuss the peer evaluation comments with his or her group and to lead the decision making about how to revise their sites based on these evaluative comments.

BEST COPY AVAILABLE

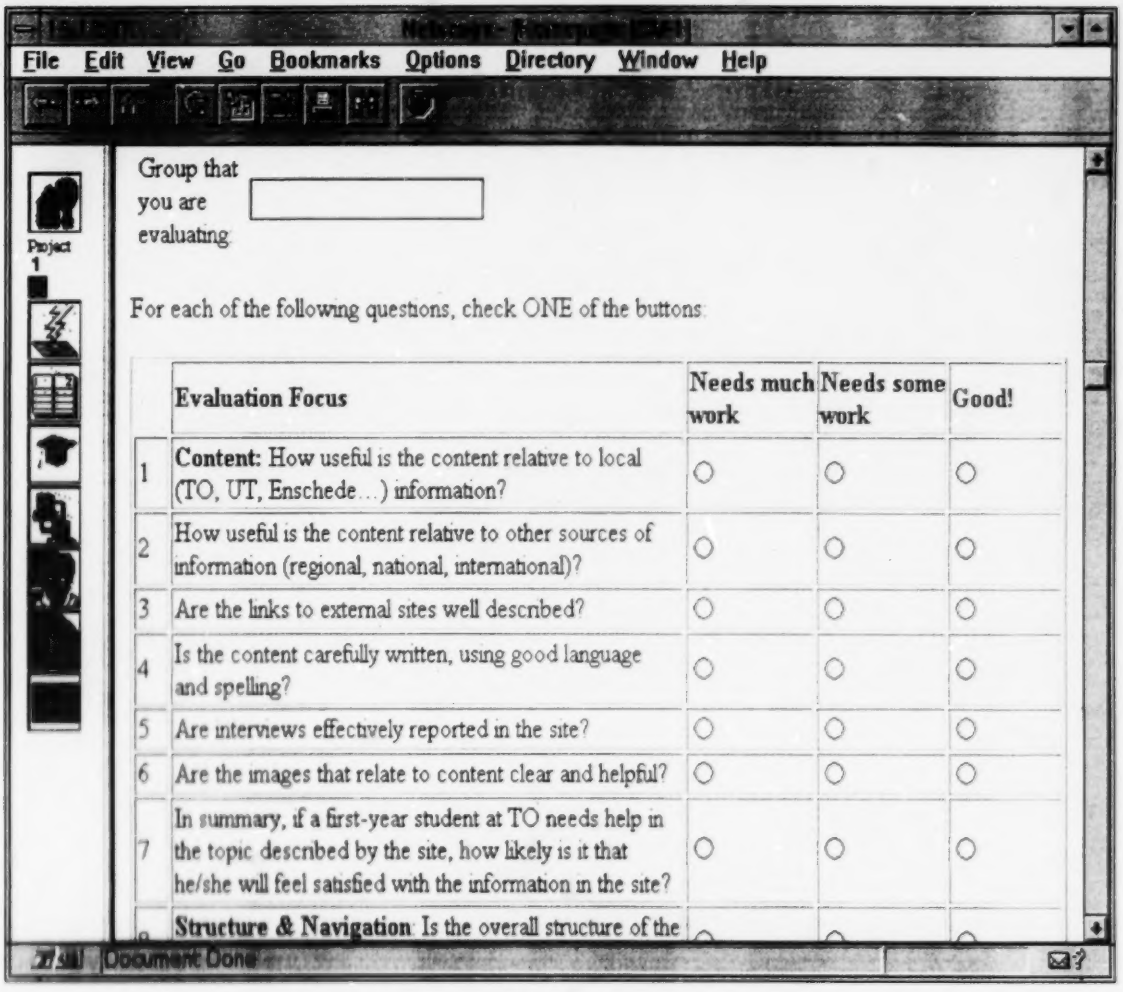
File Edit View Go Bookmarks Options Directory Window Help
Project 1
Group that you are evaluating
For each of the following questions, check ONE of the buttons:
Evaluation Focus
Needs much work
Needs some work
Good!
1 Content: How useful is the content relative to local (TO, UT, Enschede...) information?
2 How useful is the content relative to other sources of information (regional, national, international)?
3 Are the links to external sites well described?
4 Is the content carefully written, using good language and spelling?
5 Are interviews effectively reported in the site?
6 Are the images that relate to content clear and helpful?
7 In summary, if a first-year student at TO needs help in the topic described by the site, how likely is it that he/she will feel satisfied with the information in the site?
Structure & Navigation: Is the overall structure of the
Document Done

Figure 6. CG-I form for peer evaluation (and later for Course Team evaluation)

Evaluation as study material for the examination

But the integrative role of formative evaluation throughout the course does not stop with the peer evaluation. The Course Team told the students very clearly that the final evaluation of their sites would be based on not only the Course Team's use of the same evaluation forms, but also that the peer evaluation would be taken into account. Finally, the examination to follow the first project contained a major section relating to the evaluation process and its results: asking the students to reflect on points of agreement and disagreement between their own self-evaluations of their work, the evaluations of their peers, and the Course Team evaluations. Students were warned to expect this question; all feedback from the Course Team was placed in the Course Site (in the Group Centre) the day after the final presentations of the projects, so that the integration of theory and practice, through the on-going process of evaluation based on design guidelines, could be reflected in the written test for the project.

Through these processes, we believe we are making significant progress toward not only integrating the theory and practice of the course but also toward helping students develop insight and self-responsibility for their own evaluation. Evaluation should be seen as part of the on-going process not only of the course but working as a design professional. (A walk-through of all of the above evaluation-related aspects of the course can be followed by the WWW-site "guided tour" available at Collis & Meeuwsen, 1997).

BEST COPY AVAILABLE

Communication: Multiple Forms And Purposes

Students can see and hear from all course team members at the lecture sessions and can of course present questions but in a room of 85 students question-asking is only something that a few students per session can much contribute to. The Study Materials can be seen as a different form of one-to-many presentation, containing not only conceptual matter but occasionally personal reflection from the Course Team. Less-formal messages to the whole class are also important. The major example of these is the "First Stop" page of the Course Site, indicated by an ever-present icon (a lightening bolt) in the top left-hand corner of the navigation frame. The students know that it is their responsibility to check First Stop first thing on Monday morning of each week. There they find an overview of the week: what is new in the Course Site, what they should read and do for the week. This message is kept brief; its intention is to point the way to other messages that give detailed communication about weekly activities.

"Productive communication"

An major innovation in ISM-1 1996-97 compared to the 1995-96 cycle is the use of CG-I forms for "productive communication." With a CG-I form, input expected from the student can be highly structured (see the peer evaluation form in Figure 6) or can still be as open as an e-mail message. This allows us to indicate clearly to the students what input is expected, and to make it as easy as possible for them to enter this input in a consistent fashion. The student simply types directly into the Course Site. During the 1995-96 cycle of ISM-1, the inability to create structured input forms in the computer conferencing environment led to two less-than-ideal situations: Either students replied via an unstructured message, and thus were not always sure of how much was expected of them in responding, or the Course Team had to switch to separate paper forms when structured input was critical to providing guidance. Also, the flood of communication coming from the students, with many different reports and summaries, led to an unmanageable amount of mail for the Course Team to effectively read, handle, forward, and archive (there were over 3,000 e-mail messages of various sorts after the total 1995-96 cycle).

But it is not the ease and clarity of expectation that makes CG-I-form communication most important in ISM-1. It is the fact that students' communication can be clearly seen to serve a purpose in the Course Site, in fact, to become part of the study material for the course. (We have already mentioned how this is critical to the on-going evaluation processes in the course). This "productive communication" occurs by entering the content of the students' CG-I-input into HTML form, linking it to the Course Site, and then making use of it in the instructional activities of the following week or weeks. In this way, students can see that entering their input, on time, has a function to the group as a whole, because it becomes part of the learning material for the group. It also helps students to develop their self-evaluation skills, in that seeing what other students have entered and comparing it to one's own entry can be a stimulus to self-monitoring.

An example of the use of productive communication within ISM-1 can be seen from the Specialist Centre page (Figure 7). After the Specialist Sessions for each of the roles in Project 1, students were required to input, via a CG-I form, a brief summary of the main points to remember from the session. These summaries were merged into one HTML page, and then were always available from the Specialist Centre page. When students later had a question relating to any of the specialist roles, they could turn to the "Specialists' Summaries" as well as to the "Bookmarks" provided to them by the Course Team, as their first line of help. Figure 8 shows a portion of the input from the HTML specialists, available from the Specialist Centre page. Da Bormida, Donzellini, and Ponta (1996) also have commented on the importance of students becoming involved in the creation of their own learning material, "under properly defined rules, students are at the same time, users, producers, and evaluators..."(p. 160). The WWW environment in ISM-1 makes this productive communication convenient, as well as accessible to all.

Figure 7. The Specialist Centre, with learning resources for the various roles, and also with links to CG-I forms for Specialist reports.

BEST COPY AVAILABLE

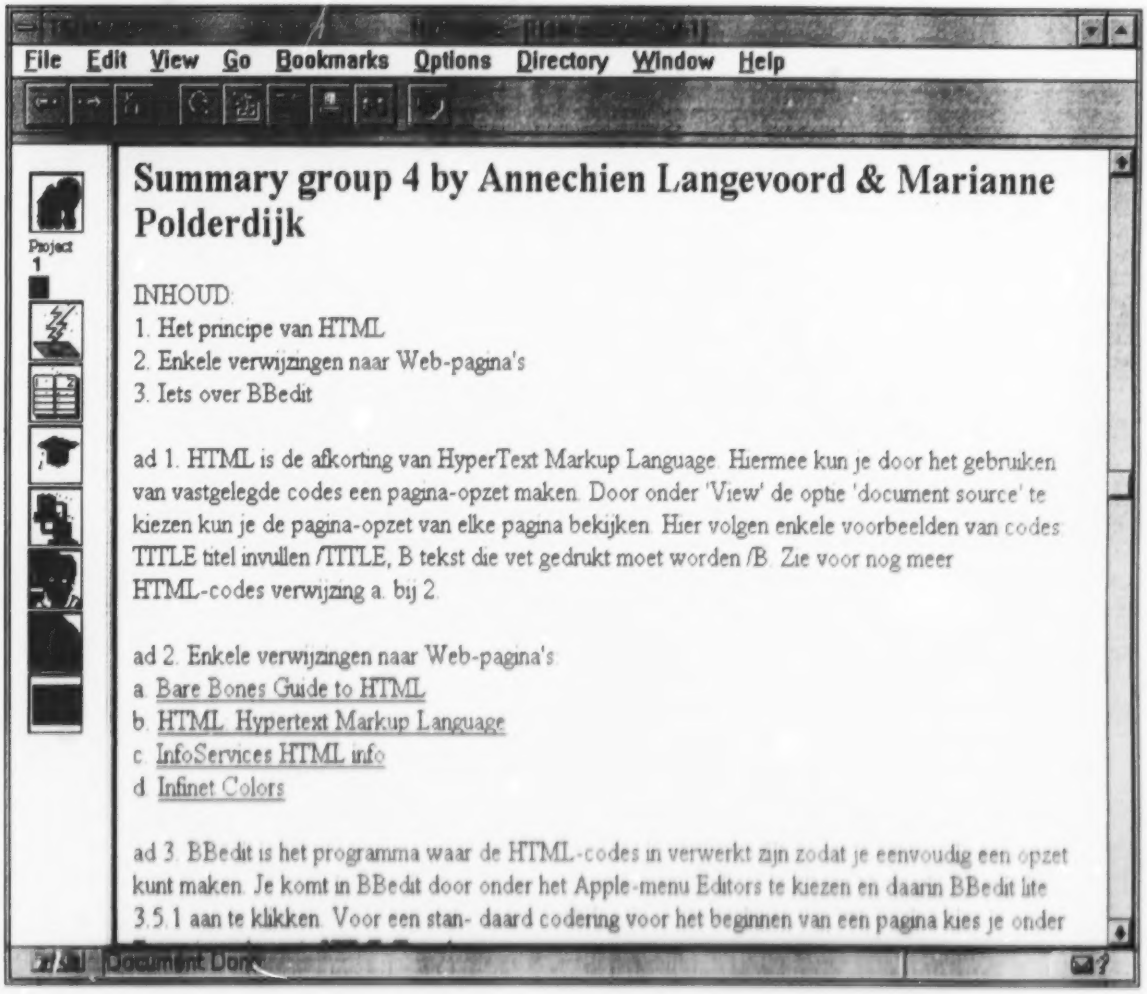
File Edit View Go Bookmarks Options Directory Window Help
Project 1
Summary group 4 by Annechien Langevoord & Marianne Polderdijk
INHOUD:
1. Het principe van HTML
2. Enkele verwijzingen naar Web-pagina's
3. Iets over BBedit
ad 1. HTML is de afkorting van HyperText Markup Language. Hiermee kun je door het gebruiken van vastgelegde codes een pagina-opzet maken. Door onder 'View' de optie 'document source' te kiezen kun je de pagina-opzet van elke pagina bekijken. Hier volgen enkele voorbeelden van codes: TITLE titel invullen /TITLE, B tekst die vet gedrukt moet worden /B. Zie voor nog meer HTML-codes verwijzing a. bij 2.
ad 2. Enkele verwijzingen naar Web-pagina's:
a. Bare Bones Guide to HTML
b. HTML: Hypertext Markup Language
c. InfoServices HTML info
d. Infinet Colors
ad 3. BBedit is het programma waar de HTML-codes in verwerkt zijn zodat je eenvoudig een opzet kunt maken. Je komt in BBedit door onder het Apple-menu Editors te kiezen en daarna BBedit lite 3.5.1 aan te klikken. Voor een stan- daard codering voor het beginnen van een pagina kies je onder
Document Done

Figure 8. Summary of the specialist reports, available as a study aid for HTML coding.

Toward Self-Responsibility: Learning How To Learn

An important part of the philosophy of ISM-1 is scaffolding the students toward self-responsibility . The example shown in Figure 8 is typical of this philosophy. If students have a question, they must learn a series of strategies to find help themselves. The Course Team has the responsibility to make as much help available as is useful, such as seen in the Bookmarks and Specialist Summaries in the Specialist Centre page (Figures 7 and 8). But the students must learn to look for help in the Specialist Centre, and in other places in the Course Site. After this, the students must learn to ask each other for help; this is part of the peer teaching philosophy of the course and consistent with Vigotsky's theories of peer support. Students also have available to them examples of other students' work (through the Group Centre page, for example), and should learn to look at those examples for help. After this, the Communication Centre is always available, and a message sent to the Course Team members will be answered within the day. But of course, unaccountable problems do arise, often related to the network or something like a room being unexpectedly locked. Students must learn how to classify their problems, and how to identify which require immediate human intervention (unlocking a door) compared with those that require patience and regular checking (waiting when the network is down).

Despite the efforts that were made in the 1995-96 cycle of ISM-1, the comment was expressed in the cycle 1 evaluation report that students needed (or wanted) a clearer sense of where to get help. Thus the 1996-97 Course Site is being carefully designed to make adequate help clearly available.

BEST COPY AVAILABLE

However, providing adequate on-line help, and supporting students in their growth toward being self-reliant and good peer supports for each other, is not a simple task, and will continue to be an action area for the Course Team. One idea we hope to develop is a question-and-answer component in the Course Site, where we can build on students' questions and evolve these into an "answer web" (Smeaton & Neilson, 1994) that students can consult, and to which they can contribute. Another focus is to continue to try to help the Managers develop more-effective managerial skills, not an easy task for students just out of secondary school (or for professionals, as well; see McDaniel and Liu, 1996, for a good analysis of the skills and insights needed for good management of multimedia development projects). In the "Group Planning Pages" for the second project of the 1996-97 cycle of ISM-1, we are now using a WWW-based approach to a project-management tool to help Managers more in their tasks.

The Evolution Continues

The course ISM-1 is a learning experience for all involved, and thus we can identify many areas in which we will continue to pay particular attention even after the 1996-97 cycle. A research project is already underway focusing on helping students become better at managing their own work and helping the instructors to have adequate information about the students' work so that appropriate feedback can be given "just in time" (Van der Veen, 1996). Another research project will begin in 1997 in which scaffolding will receive major attention: how can scaffolding be effectively incorporated, and withdrawn, for students working more and more independently with WWW-based environments, such as the group project work in the course ISM-1? (Collis & Verhagen, 1996). Another important focus is peer teaching: How can we help the students to help each other in increasingly effective ways? (The "intelligent coach" to support the Jigsaw Method in teams of computer science students working together on complex programming tasks which has been developed by McManus and Aiken, 1995, is an example we wish to explore). The long-standing issue of media selection is also important to us: The integrated WWW site offers many benefits compared to non-electronically linked course materials, but the important benefits of other media, such as printed text, need to be also considered. Perhaps not everything should be in the WWW site, even if it is digitally possible, but by what criteria do we decide?

A particular focus is that of integrating multimedia resources in the course site. As one aspect, how can we, as Da Bormida and his colleagues suggest (1996), make increasingly effective use of the students' own work as examples within the Course Site? Partly this is a technical challenge. We are already exploring the integration of CD-ROM materials with the Course WWW site during the 1996-97 cycle in order to better utilize the video products made by the Cycle 1 cohort. In addition, in order to continue our emphasis on linking theory and practice, we would like to be able to link videotaped fragments of the lectures to appropriate points in the students' group work and self-study. To do this, we are planning for a video-on-demand component to eventually become part of the course site. Integration of multimedia resources, either from the students' work or from videotaped fragments or the lecture sessions, is by no means only a technical issue. The instructional issues and design issues involved in selecting appropriate video segments of appropriate lengths, indexing them effectively, and pointing out to the students how to apply those examples to their own work will occupy our attention, as designers, instructors, and researchers, for many years to come (Verhagen & Blanke, 1996).

References

Aronson, E., Blaney, N., Stephen, C., Sikes, J., & Snapp, M. (1978). *The jigsaw classroom*. Beverly Hills, CA: Sage.

Breman, J., & Carleer, G. (1996). *"Gestructureed projectonderwijs voor eerstejaars studenten Toegepaste Onderwijskunde"* (Structured project-based education for first-year students in the Faculty of Educational Science and Technology). Enschede, NL: University of Twente.

Brown, M. I., Dought, G. F., Draper, S. W., Henderson, F. P., & McAteer, E. (1996). Measuring learning resource use. *Computers & Education, 27*(2), 103-113.

Casey, M. B., & Tucker, E. C. (1994). Problem-centered classrooms: Creating lifelong learners. *Phi Delta Kappan, 76*(2), 139-144.

Chan, S. L., & Horace, H. S. (1996). Efficient methodology for automatic video-content indexing and retrieval of lectures for CAI systems. In P. Carlson & F. Makedon (eds.), *Proceedings of ED-MEDIA/ED-TELECOM '96* (p. 137-141). Charlottesville, VA: AACE.

Collis, B. (1996). *Tele-learning in a digital world: The future of distance learning*. London, UK: International Thomson Computer Press. [see URL: http://www.itcpmedia.com]

Collis, B., & Meeuwsen, E. (31 January 1997). *New approaches to evaluation via the WWW*. Paper presented at the Symposium, "Teleleren aan de Universiteit Twente" (Tele-Learning at the University of Twente), CTIT (Centre for Telematics and Information Technology, University of Twente. [WWW document] URL http://www.to.utwente.nl/ism/ism1-96/presenta/present1.htm

Collis, B., & Verhagen, P. (1996). *Scaffolding the development of skills in the design process for educational media through hyperlinked units of learning material (ULMs).* Internal report, Faculty of Educational Science and Technology, University of Twente.

Da Bormida, G., Donellini, G., & Ponta, D. (1996). Teacher-learners'cooperation produces an innovative computer-based course. In P. Carlson & F. Makedon (eds.), *Proceedings of ED-MEDIA/ED-TELECOM '96* (p. 160-165). Charlottesville, VA: AACE.

Gustafson, K. L. (1993). Instructional design fundamentals: Clouds on the horizon. *Educational Technology, 32*(2), 27-32.

Hawkins, P., & Winter, J. (1996). The self-reliant graduate and the SME. *Education + Training, 38*(4), 3-9.

Jonassen, D. (1995). Supporting communities of learners with technology: A vision for integrating technology with learning in schools. *Educational Technology, 35*(4), 60-63.

Liu, M. (1996). Collaborative learning with multimedia. In P. Carlson & F. Makedon (eds.), *Proceedings of ED-MEDIA/ED-TELECOM '96* (p. 787). Charlottesville, VA: AACE.

Liu, M., & Rutledge, K. (1996). Engaging high school students in multimedia development. In P. Carlson & F. Makedon (eds.), *Proceedings of ED-MEDIA/ED-TELECOM '96* (p. 395-400). Charlottesville, VA: AACE.

McDaniel, K., & Liu, M. (1996). A study of project management techniques for developing interactive multimedia programs: A practitioner's perspective. *Journal of Research on Computing in Education, 29*(1), 29-48.

McManus, M., & Aiken, R. (1995). Using an intelligent tutor to facilitate collaborative learning. In B. Collis & G. Davies (Eds.), *Innovating adult learning with innovative technologies* (pp. 49-64). Amsterdam: North Holland Elsevier.

Slavin, R. E. (1990). *Collaborative learning: Theory, research and practice*. Englewood Cliffs, NJ: Prentice-Hall.

Smeaton, C., & Neilson, I. (1994). *The Answer Web*. Paper presented at the Fourth International Conference of the WWW, Boston. [WWW document]
URL http://www.orbital.co.uk/orbital/www5.html

Veen, J. van der (1997). *Project Support: A description of the project.* [WWW document] URL http://wwwtios.cs.utwente.nl/~vdveenj/project5.htm

Verhagen, P. W., & Blanken, H. D. (1996). *Distributed educational multimedia databases: Design, production and application.* Internal report, Faculty of Educational Science and Technology, University of Twente, Enschede.

Appendix

Evaluation feedback from students, Project 1 of 1996-97 cycle of the course "ISM-1"

Note: The evaluation results were submitted by the students in the 1996-97 cycle of the course (n =85) via a CG-I script within the course WWW site early in the first project and after the completion on the first project, as a paper-based questionnaire completed during the first examination. For each item, there was a five-point scale, with "1" labelled as "strongly disagree", "2" as "disagree somewhat", "3" as neutral, "4" as agree, and "5" as strongly disagree. The following compares some of the responses at these two time periods.

Questions (n = 80 students responding, out of 88)	Near the start of Project 1 (Sept. 96), median score	After completion of Project 1 (Dec 96), median score
1. The communication between the group members is sufficient.	4	4
2. My group has maintained a good division of tasks.	4	4
3. The efforts of each individual group member on the project work are comparable.	3	3
4. I was able to work by myself on my tasks without help.	4	4
5. The support from the staff members is sufficient.	4	4
6. I enjoy working on ISM-1.	4	5
7. I like the specialist tasks that I have in my group.	4	4
8. I like the topic our group is working on.	4	4
9. I am satisfied with the learning effect of my work so far.	4	4